Also on Page 1, please replace the first full paragraph with the following paragraph:

--The invention concerns to a procedure for the photometric determination of the quality of gas, particularly of burnable gases, according to the pre-characterising part of claim 44 and claim 51 and also devices for the photometric determination of the quality of gas, particularly of burnable gases, according to the pre-characterising part of claim 55 and claim 66.--

On Page 8, please replace the third full paragraph with the following paragraph:

--The solution of the object according to the invention results in respect of the procedures from the characterising features of the claims 44 respectively 51 in accordance with the features of the associated pre-characterising part. The solution of the object according to the invention results in respect of the devices from the characterising features of the claims 55 respectively 66 in accordance with the features of the associated pre-characterising part. Further advantageous embodiments of the invention result from the respective dependent claims.--

On Pages 8-9, please replace the last paragraph bridging pages 8 and 9 with the following paragraph:

--The invention concerns to a first procedure according to claim 44, with which the determination of the quality of gas of a probe gas, in particular a burnable gas, is carried out based on a spectrum of the probe gas determined under operating conditions by means of infrared spectroscopical measurement procedures. Herein the quality of gas of a probe gas is determined in such a way according to the invention, that in a first step of the procedure the amounts of substances x_i of the components of the probe gas at operating conditions are determined out of

the spectrum, where after default values for compressibility factor K and real gas factor Z_n are preset for calculation of the wanted compressibility factor K and than out of quantities at operating conditions of the probe gas as well as from the amounts of substances x_i and substance specific quantities such as calorific values per sort of molecule of the components and the respective masses of molecules, and taking into account of the selected default values for compressibility factor K and real gas factor Z_n the needed input quantities for the determination of the compressibility factor K are determined. These input quantities are used, to calculate the compressibility factor K by means of standard-arithmetic procedures. In a further step of the procedure an iterative calculation in the way of an iterative recalculation of the input quantities is carried out with the determined value for the compressibility factor K as long, until the value of the compressibility factor K converges. There from the volumetric standard calorific value $H_{v,n}$ and the standard density ρ_n can be calculated. In the case of converging the needed quantities compressibility factor K, standard calorific value $H_{v,n}$ and the standard density ρ_n for determination of the quality of gas of a probe gas are known and can be used respectively for example for the calculation of the energy content of the transported gas. At each iteration the just determined value for the compressibility factor K is put back again into the equations for calculating the input quantities of the standard-arithmetic procedure and a new iteration step is carried out. By means of this procedure starting with the determination of the amounts of substances x_i out of the recorded spectrum and the iteration procedure with the help of the default values for the compressibility factor K and real gas factor Z_n after a respective number of iteration steps the really existing values for the compressibility factor K and there from than the values for standard-calorific value $H_{v,n}$ and the standard density ρ_n in the probe gas can be determined with

adequate accuracy. In this way the compressibility factor K is determined out of the spectroscopical measurable quantities in operation conditions as well as out of the default values for the compressibility factor K and real gas factor Z_n and the real gas calculation itself can be carried out with standard-arithmetic procedures and these arithmetic procedures itself are again iterational procedures. --

On Page 14, please replace the second and third full paragraphs with the following paragraphs:

--Also it may be thinkable, that the default values for compressibility factor K and real gas factor Z_n are taken from a characteristic diagram, that describes the influence of the pressure p_b at operating conditions and the temperature T_b at operating conditions for a known composition of a gas similar to the composition of the probe gas. As described before for the procedure according to claim 44, in this way good starting values as a good first approximation for the compressibility factor K and the real gas factor Z_n can be determined, which contributes to a fast convergence also of this procedure according to the invention.

The invention also concerns to a photometric device for the determination of a transmission spectrum of a probe gas, especially for carrying out one of the procedures according to claim 44 or claim 51.--

On Page 16, please replace the second full paragraph with the following paragraph:

--The invention concerns furthermore to a generic photometric device for the determination of a transmission spectrum of a probe gas, especially for carrying out one of the procedures according to claim 44 or claim 51.--

On Pages 21 and 22, please replace the paragraphs regarding the Figures with the following paragraphs:

--Figure 1 - a typical distribution in a spectrum for different ingredients of natural gas,

Figure 2a - fundamental procedure of a two-staged iterational procedure according to claim 44,

Figure 2b - fundamental procedure of a two-staged iterational procedure according to claim 51,

Figure 3 - a fundamental structure of a photometric device according to the state of the art,

Figure 4 - a device according to the invention related to claim 55, which is coupled to a probe cell by means of waveguides and determines the spectrums by means of filters,

Figure 5 - a first device according to the invention related to claim 66, in which a chopper arrangement with a sector element aperture is provided for selection of wavelengths,

Figure 6 - a second device according to the invention related to claim 66, in which a chopper arrangement with a spiral aperture is provided for selection of wavelengths,

Figure 7 - a further device according to the invention related to claim 66 according to the reference beam principal of claim 72,

Figure 8 - an embodiment of the device according to figure 7 with synchronisation by the chopper arrangement itself,

Figure 9 - an embodiment of the probe cell as hollow shaft guide,

Figure 10 - a connection of the probe cell to a waveguide with the help of GRIND-lenses,

Figure 11 - an embodiment of the invention according to claims 84 to 86 with a modulation of the measurement radiation.--

On Pages 25-26, please replace the last two paragraphs on page 25 and the first full paragraph on page 26 with the following paragraphs:

--A multivariate analysis (MVA), as outlined in the literature (DVGW-worksheet 486), delivers the volumetric amounts of substances of the gas components at operation conditions. The here presented procedure according to claim 44 describes, how moreover with these data the standard calorific value $H_{v,n}$, the standard density ρ_n and the compressibility factor K can be ascertained.

With the procedure according to claim 51 by means of a spectral weighting function the spectrums can be evaluated directly without detailed resolution of the individual gas components.

The specification of the calorific value $H_{v,b}$ at operation conditions according to this procedure is lined out in the patent application DE 198 38 301.0. The volumetric amount of substance of CO_2 at operating conditions can be evaluated as separate absorption band according to common spectroscopic procedures.

Vital component of the here introduced procedure according to claim 51 is the spectral measurement of the density ρ_b at working conditions, therefore also the convolution of the spectrum with a spectral function is used. The physical background of the procedure is herein, that each binding of the infrared active gas components contribute for extinction and so represents the mass of the partners of the binding in the spectrum. The frequency of oscillation of the binding and therewith their spectral location depends on the reduced mass of the partners of the binding. Therewith the spectrum contains in its amount and its spectral distribution at appropriate evaluation information for the determination of the density of the gas.--

Also on Page 26,-27 please replace the last paragraph bridging pages 26 and 27 with the following paragraph:

--In the figures 2a and 2b the flows of the two-stage iterational procedure according to the above mentioned equations are illustrated once more precisely. In the figure 2a is represented the principal flow of the calculation of the procedure according to claim 44 with the both alternative iterational procedures AGA8-92DC and GERG88, which start from the results of the multivariate analysis (MVA) by means of the ascertained spectrum. In the figure 2b is represented however the principal flow of the calculation of the procedure according to claim 51, that starts from the results of the direct spectral evaluation (DAS) and than uses the iterational procedure GERG88.--

On Pages 28-29, please replace the last paragraph bridging pages 28 and 29 with the following paragraph:

SUB B13 A10

--In the following figures 4 to 10 are outlined now advantageous embodiments of the devices according to the invention according to the claims 55 and 66. Same numerals indicate respectively identical or functionally similar devices, so that in the figures 4 to 10 In essence only the differences in the respective embodiments are represented and otherwise is referred to the respective above mentioned description.--

On Page 30, please replace the first full paragraph with the following paragraph:

SUB B14 A11

--In a first conceivable embodiment of the invention according to claim 55 and figure 4 the device is coupled by means of optical fibres 19 to the probe cell 3 and can like this be installed in an explosion-free room behind an explosion barrier 20, while the intrinsic measuring cell itself is located near the gas conduit 18 within not explosion free room. For the recording of a null spectrum and in doing so the offset-transmission of the optical system the probe cell 3 can be filled with a spectroscopical inactive inert gas 23, in infrared for example nitrogen. Alternatively the probe cell 3 can be admitted in addition with a calibrating gas 24 for the verification of the measurement values. Null- and calibrating measurement are carried out in appropriate selected time intervals and are controlled via a valve block 25 by the computational unit 10. This embodiment can also be combined with the other implementations.--

On Page 35, replace the paragraph with the following paragraph:

A12 SUB B16

--The figures 4 to 11 show in a very simplified representation an equipment basic design of a device according to the claims 55 or 66. In this the description is restricted to the essential